

1969

**OPERATING
SUMMARY**

MARKHAM TOWN

water pollution control plant

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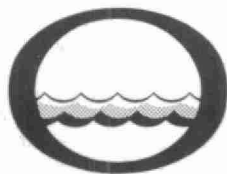
Division of Plant Operations

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Water management in Ontario

Ontario
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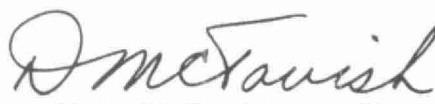
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Toronto 195
Ontario

The operating efficiency and financial status of the water pollution control facilities operated for you in 1969 are presented in the following pages.

The regional operations engineer's comments and the statistical data will assist you in gauging the plant's level of performance. A new flow chart and up-to-date design data are also provided.

Various divisions and sections within the Commission have co-operated in providing what we trust is an accurate and concise annual operating summary.


D.S. Caverly,
General Manager.


D.A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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MARKHAM
water pollution control plant

operated for

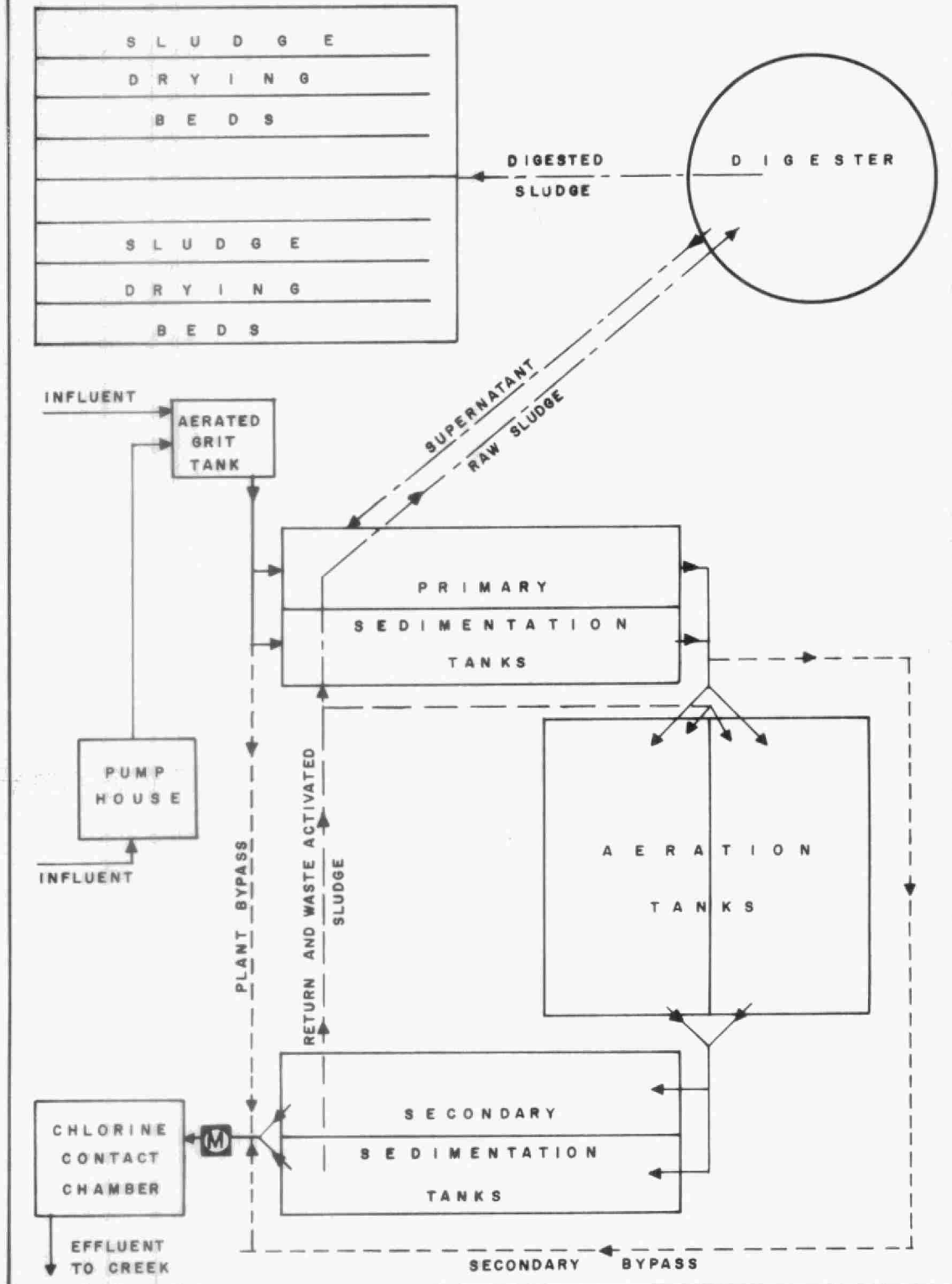
THE TOWN OF MARKHAM

by the

ONTARIO WATER RESOURCES COMMISSION

1969 ANNUAL OPERATING SUMMARY

TOWN OF MARKHAM WATER POLLUTION CONTROL PLANT



DESIGN DATA

PROJECT NO.	2-0040-59	TREATMENT	
DESIGN FLOW	0.67 mgd	DESIGN POPULATION	8,000
BOD - Raw Sewage	215 mg/l	SS - Raw Sewage	220 mg/l
- Removal	95%	- Removal	95%

PUMPING STATION

Type: Fairbanks-Morse
Size: Two 350 gpm @ 40' tdh

Size: One 700 scfm @ 5 psi (standby)
One 1075 scfm

Diffusers

- 72 spargers (17" centre)

PRIMARY TREATMENT

Comminution

Type: C.P. Barminutor
Size: One 18"

Secondary Sedimentation

Type: Jeffrey
Size: Two 42' x 12' x 10.5' (avg)
(66,000 gal)
Retention: 2.38 hours
Loading: Surface, 660 gal/ft²/day
Weir, 4,750 gal/ft/day

Grit Removal

Type: Aerated
Size: One 13' x 6' x 8.1' swd
(4,240 gal)
Retention: 9.2 min

CHLORINATION

Type: W & T
Size: One 70 lb/day

Primary Sedimentation

Type: Jeffrey
Size: Two 42' x 12' x 7' 9" (avg)
(48,800 gal)
Retention: 1.76 hours
Loading: Surface, 660 gal/ft²/day
Weir, 27,800 gal/ft/day

Chlorine Contact Chamber

Size: 20' x 11.38' x 8.5' swd (12,080 gal)
Retention: 26 min

SECONDARY TREATMENT

Aeration Tanks

Type: Diffused air, single pass
Size: One 51' x 22' x 15' (33,600 cu ft
or 210,000 gal)
One 51' x 28' x 15' (39,230 cu ft
or 245,000 gal)

OUTFALL

- to Exhibition Creek
(tributary of Rouge River)

Air Supply

Type: Sutorbilt and Aerzen

SLUDGE HANDLING

Digestion System - Single-stage

Type: Mixed by recirculation
Size: One 45' dia x 20' swd (34,240 cu ft
or 220,000 gal)
Loading: 0.67 lb/cu ft/ mo

Sludge Drying Beds

Size: Four 90' x 20' (7,200 sq ft)



EXPENDITURES

The total operating cost for the year was \$29,098.52, an increase of \$7,565.32 over 1968.

The unit cost of treating one million gallons increased from \$105.46 in 1968 to \$134.16 in 1969. Increased costs were reflected in salaries, sludge haulage, power and repairs and maintenance.

PLANT FLOWS and CHLORINATION

In 1969 the plant treated an average flow of 0.59 mgd. This is an increase of 7 percent over the 1968 average. The average flow does not include the volume of sewage received at rates greater than the flowmeter capacity of 1.0 mgd. The peak rates greater than the design flow of 0.67 mgd were given primary treatment and chlorination.

The final effluent was disinfected with 7,619 lbs. of chlorine to give a residual of 0.5 milligrams per litre after 15 minutes. The average dosage was 3.7 mg/l.

PLANT EFFICIENCY

The average raw sewage BOD and suspended solids concentrations were 193 mg/l and 246 mg/l respectively. These loadings show an increase over the previous two years.

The average BOD and suspended solids reduction efficiencies were 81 and 78 percent.

The average final effluent concentrations of 34 mg/l BOD and 53 mg/l suspended solids were above OWRC objectives of 15 mg/l for each. However, the effluent improved considerably over previous years.

A total of approximately 13 tons of BOD and 17 tons of suspended solids was removed during the year.

A total of 1501 cubic feet of grit was removed from the raw sewage. This total represents an average of 7.6 cubic feet of grit per million gallons of raw sewage treated which is above normal.

AERATION

The average concentration of the primary effluent directed to the aeration tanks was 118 mg/l BOD and 155 mg/l suspended solids. The average mixed liquor suspended solids concentration in the aeration tanks was 2660 mg/l. The food to micro-organism ratio average was 0.19 which was within the limits of good aeration tank operation. An average of 3463 cubic feet of air was required to remove one pound of BOD from the aeration section.

SLUDGE DIGESTION and DISPOSAL

A total of 1,869,000 gallons of raw sludge was pumped to the digester. This is an increase compared with previous years, and is due largely to increased efficiency of the primary settling tanks since the plant enlargement.

The raw sludge averaged 4.2 percent total solids of which 58 percent was volatile matter. Digested sludge averaged 4.3 percent total solids of which 45 percent was volatile. The average reduction in volatile matter was approximately 41 percent which is satisfactory.

A total of 2320 cubic yards of digested sludge was hauled from the digester by tank truck. A total of 180 cubic yards of dried sludge was removed from the drying beds. Much of this dried sludge was used by local residents for lawn and garden fertilizer.

GENERAL

Construction was completed on the plant expansion, which doubled the capacity to 0.67 mgd.

The plant and its operators, Ian Baron and John Moment, received an award for the best-operated OWRC plant in the under 1.0 mgd category.

Major repair work was done on the No. 1 final clarifier with replacement of sprockets bearings and flights. This was the first substantial repair since the clarifier was built. The barminutor and digester recirculating pump was overhauled as part of the regular maintenance.

Throughout the year, fuel oil was received in the west trunk sewer. This often caused scum problems and on one occasion it was necessary to pump 2,000 gallons from the primary tank.

CONCLUSIONS

The plant is now operating at flows which exceed the capacity 15 percent of the time. This results in an effluent which does not meet OWRC objectives.

It is now proposed to increase the capacity and provide treatment for nutrient removal.

PROJECT COSTS

2 - 0040 - 59

NET CAPITAL COST (Final) Long Term Debt to OWRC	<u>\$608,711.07</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1969	<u>\$142,364.55</u>
Net Operating	\$ 29,098.52
Debt Retirement	12,284.00
Reserve	2,859.65
Interest Charged	<u>34,078.61</u>
TOTAL	<u>\$ 78,320.78</u>

RESERVE ACCOUNT

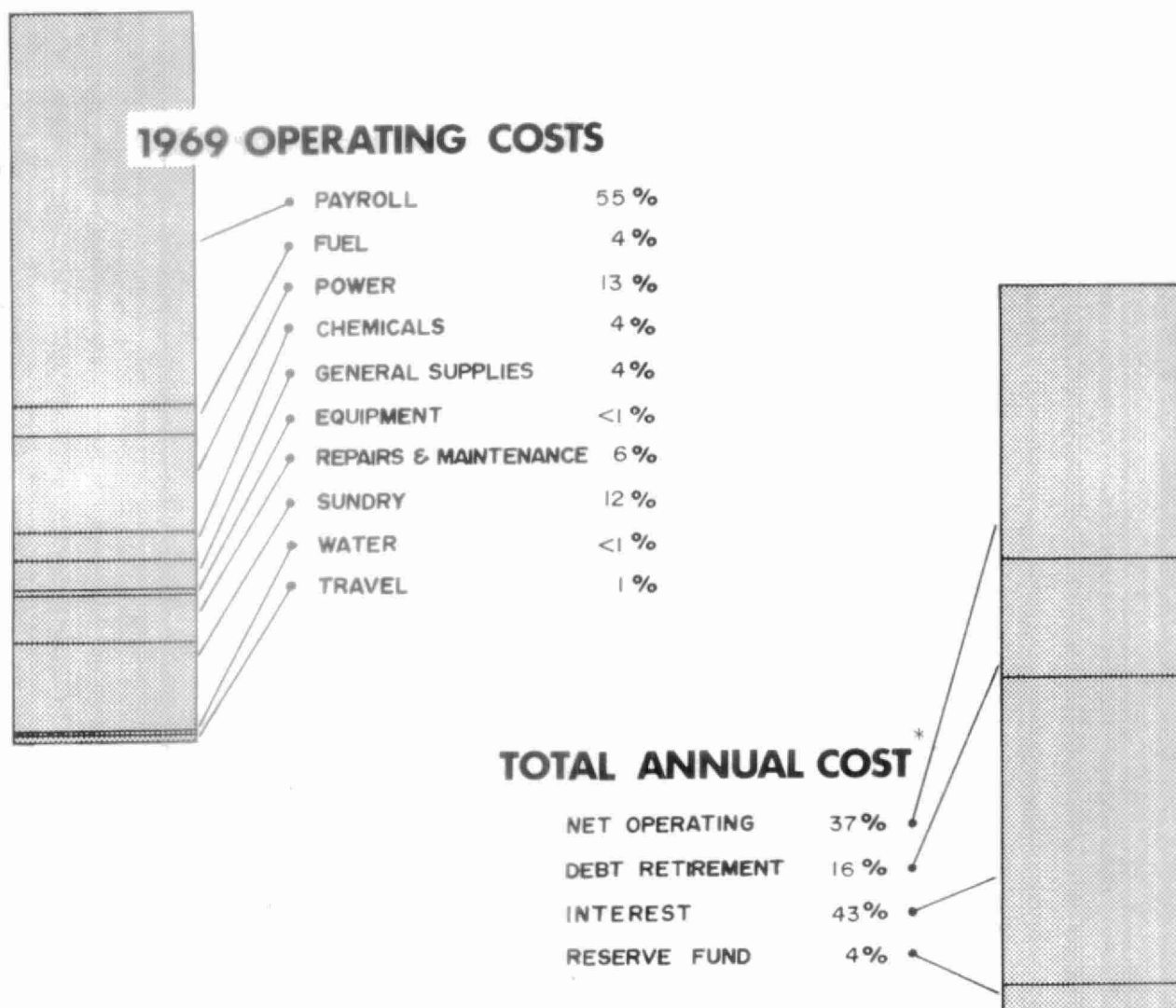
Balance @ January 1, 1969	\$ 25,667.69
Deposited by Municipality	2,859.65
Interest Earned	<u>1,505.50</u>
	\$ 30,032.84
Less Expenditures	<u>600.00</u>
Balance @ December 31, 1969	<u>\$ 29,432.84</u>

2-0055-60

NET CAPITAL COST (Final)	\$234,552.58
DEDUCT - Payments from Municipality	<u>234,552.58</u>
Long Term Debt to OWRC	\$ <u>-</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1969	\$ <u>-</u>
Net Operating	-
Debt Retirement	-
Reserve	\$ 1,410.47
Interest Charged	<u>-</u>
TOTAL	\$ <u>1,410.47</u>

RESERVE ACCOUNT

Balance @ January 1, 1969	\$ 7,464.53
Deposited by Municipality	1,410.47
Interest Earned	<u>456.01</u>
	\$ 9,331.01
Less Expenditures	<u>-</u>
Balance @ December 31, 1969	\$ <u>9,331.01</u>



Yearly Operating Costs

YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1965	116,884	\$15,909.13	\$136.11	8 cents
1966	174,330	17,931.30	102.86	7.3 cents
1967	224,613	20,300.68	90.38	9.3 cents
1968	204,18	21,533.20	105.46	11.5 cents
1969	216.9 **	29,098.52	134.16	9 cents

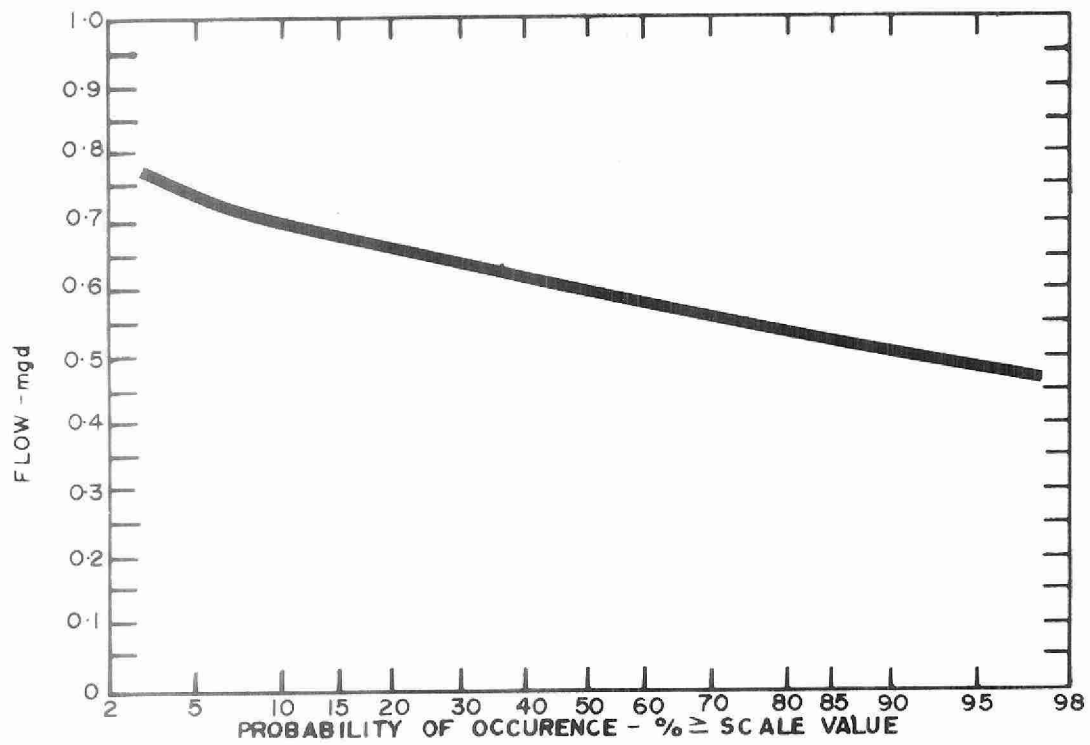
* 2-0040-59 only

8 * Prorated on 337 days' flow

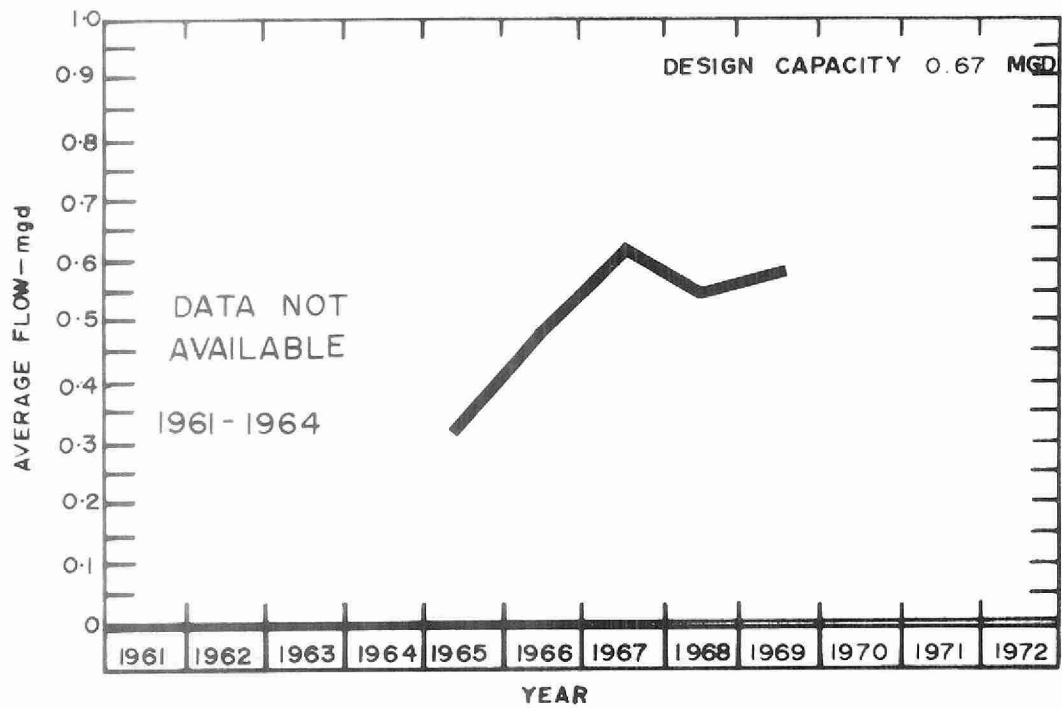
Monthly Operating Costs

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY *	WATER	TRAVEL
JAN	2391.79	1770.09	-	-	292.97	238.61	-	-	61.15	20.27	-	8.70
FEB	1891.84	1195.56	-	126.87	336.28	-	56.55	-	35.96	20.32	78.45	41.85
MAR	2688.13	1122.19	-	111.75	326.80	-	262.38	-	-	853.91	-	11.10
APR	2197.98	1270.71	-	230.95	337.14	238.61	14.50	-	-	89.37	7.40	9.30
MAY	3304.25	1335.00	-	-	354.93	-	120.75	79.00	1306.60	88.62	-	19.35
JUNE	1915.12	1151.66	-	119.21	326.23	-	132.12	10.66	152.00	23.98	15.21	10.05
JULY	2814.57	1209.00	211.33	-	305.43	220.50	103.07	102.60	83.15	566.74	-	12.75
AUG	2606.43	1793.84	308.35	106.40	306.62	-	65.37	-	3.75	22.10	-	-
SEPT	1999.29	1222.23	20.85	-	346.42	220.50	97.61	-	-	39.53	18.70	33.45
OCT	2063.40	1139.80	-	107.31	317.23	-	58.36	-	-	414.32	16.18	10.20
NOV	1924.67	1136.12	-	-	354.36	220.50	17.68	-	-	139.51	-	56.50
DEC	3265.05	1147.03	-	222.98	320.86	-	278.05	-	-	1266.44	14.99	14.70
TOTAL	29098.52	15493.23	540.53	1025.47	3925.27	1138.72	1206.44	192.26	1652.61	3545.11	150.93	227.95

* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE \$2678.00



F L O W S



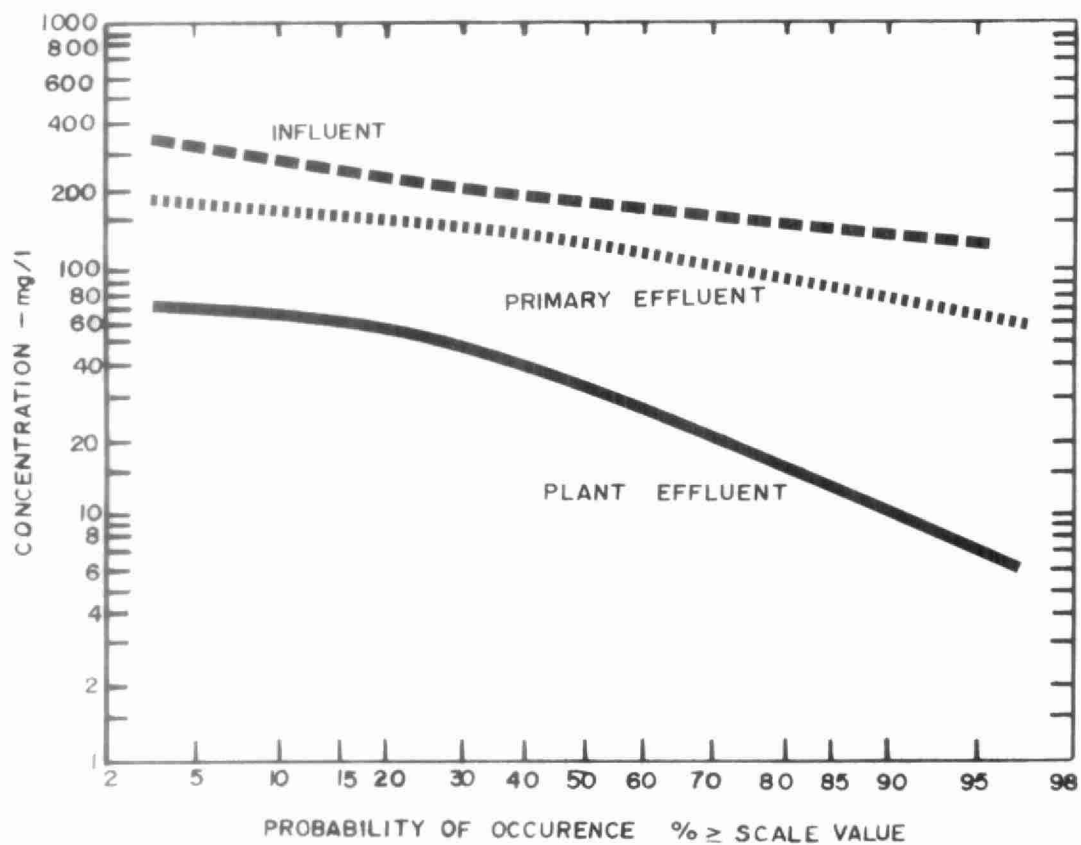
PLANT FLOWS and CHLORINATION

MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED pounds	DOSAGE mg/l
JAN	17.6*	.55	.70	.42	401	3.2
FEB	o/s	-	-	-	576	0
MAR	20.2**	.65	.80	.48	690	3.4
APR	17.5	.58	.80	.42	647	3.7
MAY	21.2	.68	.81	.56	749	3.5
JUNE	14.4	.48	.60	.41	785	5.4
JULY	17.3	.56	.63	.49	690	4.0
AUG	17.9	.58	.72	.39	636	3.6
SEPT	15.9	.53	.63	.44	614	3.9
OCT	17.4	.56	.71	.33	620	3.6
NOV	19.4	.65	.82	.53	577	3.0
DEC	19.8	.64	.86	.51	634	3.2
TOTAL	198.6***	-	-	-	7619	-
AVERAGE	-	.59	-	-	635	3.7

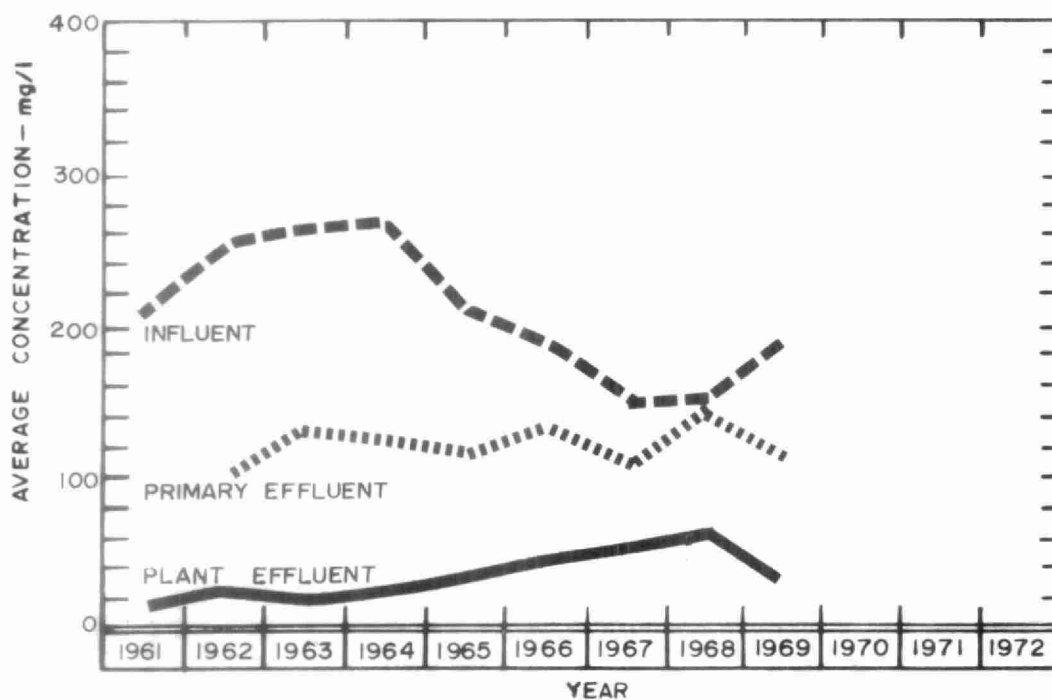
* Prorated on 16 days' data

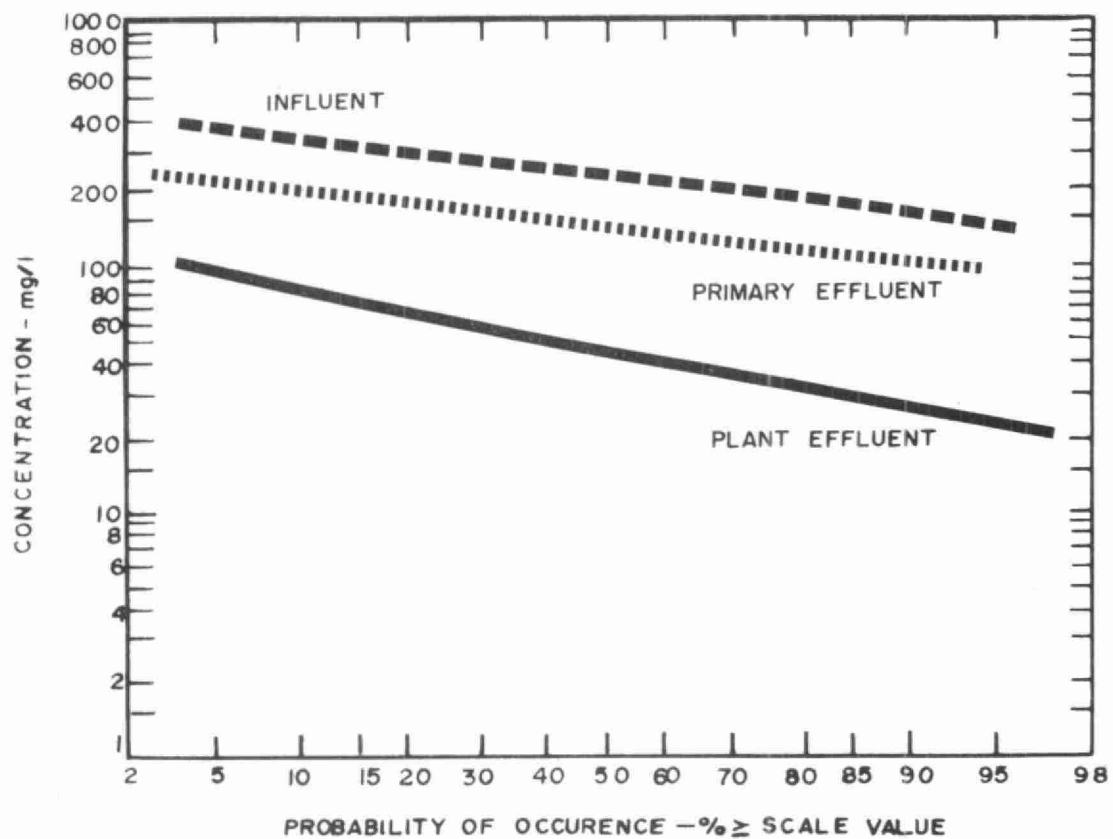
** Prorated on 27 days' data

*** 337 days' flow

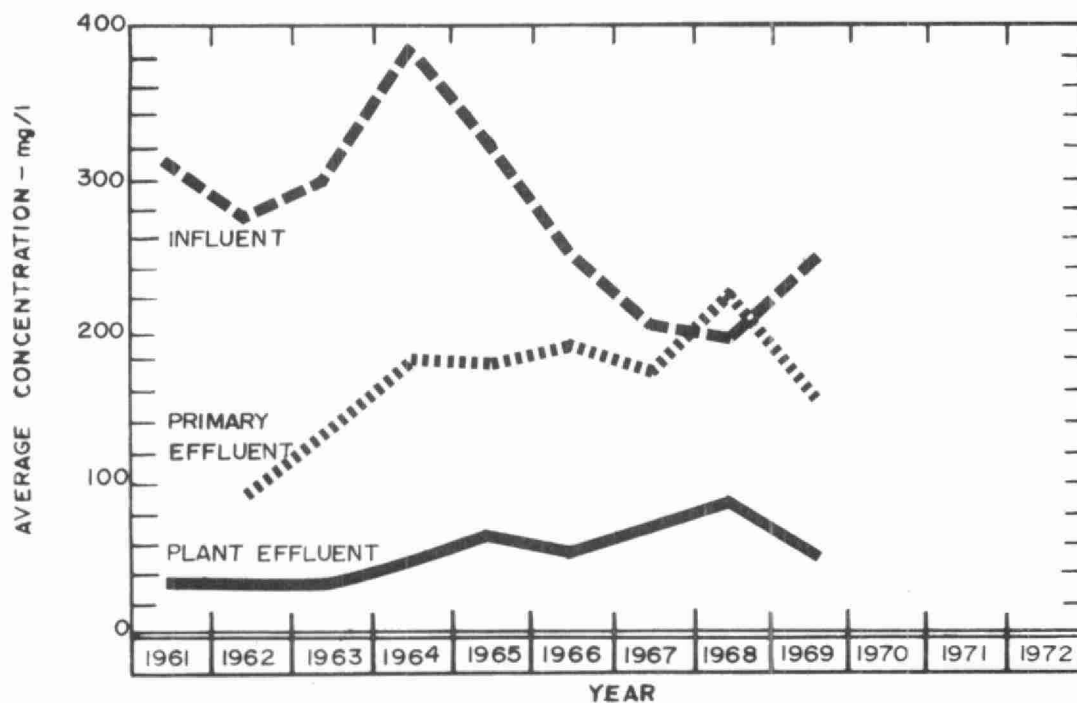


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



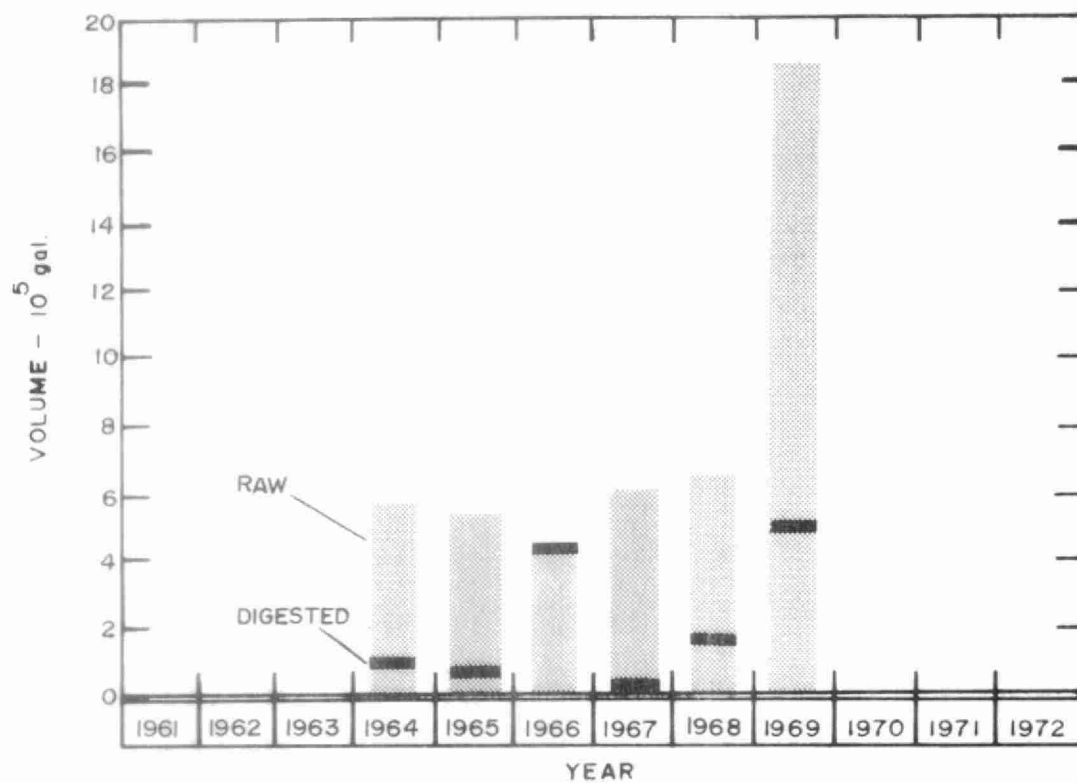
PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT REMOVAL
	INF. mg/l	EFF. mg/l	REDUCTION		INF. CONCN mg/l	EFF. CONCN mg/l	REDUCTION		
			%	10 ⁴ pounds			%	10 ⁴ pounds	cu
JAN	-	-	-	-	-	-	-	-	120
FEB	190	19	90	-	250	40	84	-	150
MAR	190	20	84	3.4	350	40	89	6.2	120
APR	125	12	90	2.0	225	55	76	3.0	135
MAY	135	50	63	1.8	170	55	68	2.4	120
JUNE	200	45	76	2.2	300	65	78	3.4	120
JULY	150	24	84	2.2	177	45	74	2.3	105
AUG	248	18	93	4.1	250	31	88	3.9	106
SEPT	170	54	68	1.8	190	85	55	1.7	110
OCT	180	51	72	2.2	300	67	78	4.1	160
NOV	192	43	78	2.9	225	60	73	3.2	115
DEC	230	38	83	3.8	270	50	81	4.3	140
TOTAL	-	-	-	-	-	-	-	-	1501
AVERAGE	183	34	81	2.6	246	53	78	3.5	125

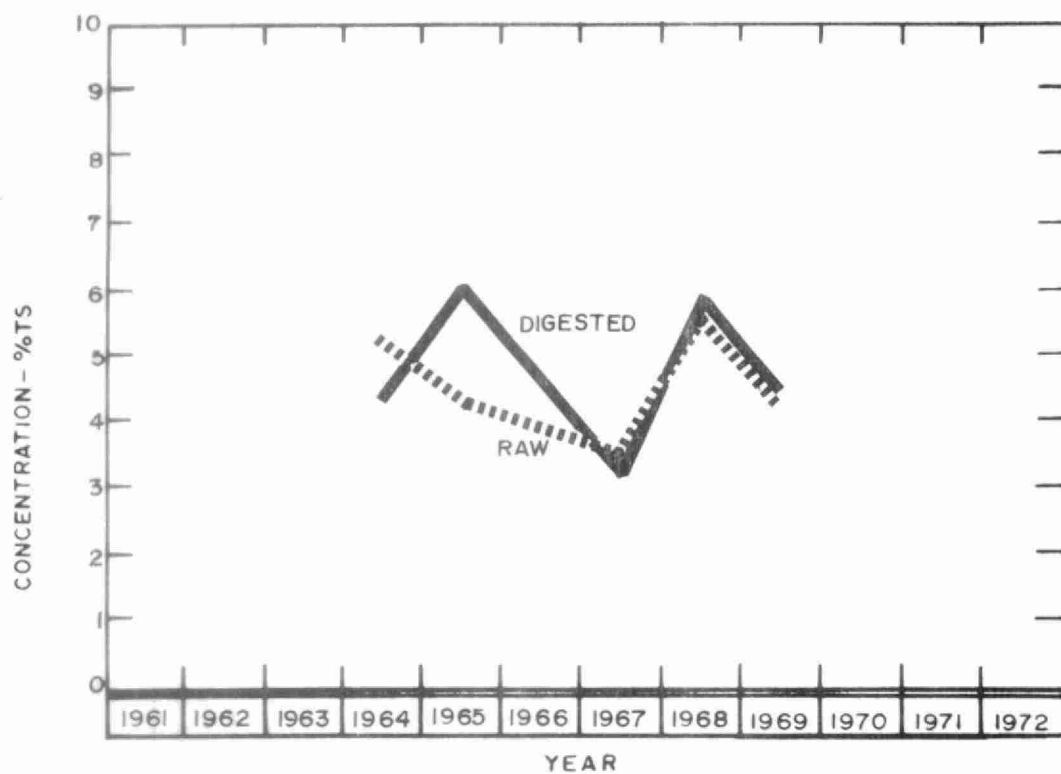
AERATION

MONTH	AVG DAILY FLOW mil gal	AERATION INF.		SECONDY. EFF.		MLSS CONCN mg/l	F/M <u>lb BOD</u> <u>lb MLSS</u>	AIR USED <u>1000 cu ft</u> <u>lb BOD</u>
		BOD	SS	BOD	SS			
		mg/l	mg/l	mg/l	mg/l			
JAN	.55	-	-	-	-	2170	-	-
FEB	*	120	160	19	40	2870	-	-
MAR	.65	100	180	20	40	2900	.16	3296
APR	.58	70	160	12	55	1950	.15	5101
MAY	.67	80	125	29	30	1980	.20	5271
JUNE	.48	115	155	60	70	2790	.14	4806
JULY	.58	115	103	23	47	2720	.17	2938
AUG	.58	114	132	16	88	3450	.14	2756
SEPT	.53	160	165	60	45	3230	.19	2989
OCT	.56	135	175	44	45	2570	.21	3105
NOV	.65	137	152	14	27	2340	.27	2055
DEC	.64	150	202	34	55	2920	.23	2309
TOTAL	-	-	-	-	-	-	-	-
AVERAGE	.59	118	155	30	49	2650	.19	3463

* Meter out of service



DIGESTION



SLUDGE DIGESTION and DISPOSAL

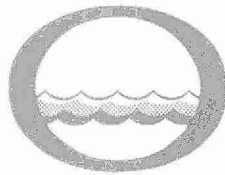
MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME	TOTAL SOLIDS	VOL SOLIDS	VOLUME	TOTAL SOLIDS	VOL SOLIDS	VOLUME	TOTAL SOLIDS	LIQUID	DEWATERED
	10 ⁴ gal	%	%	10 ⁴ gal	%	%	10 ⁴ gal	%	cu yd	cu yd
JAN	6.0	-	-	3.4	-	-	11.2	-	204	0
FEB	11.2	4.6	61	3.4	4.3	41	5.0	-	203	0
MAR	16.0	4.6	54	4.4	4.5	40	8.3	-	260	0
APR	14.2	4.4	53	3.0	4.8	22	8.8	-	180	0
MAY	10.7	3.9	57	4.5	3.7	44	6.4	-	60	0
JUNE	17.0	4.9	45	1.2	4.7	80	11.6	-	0	20
JULY	17.1	3.3	61	2.0	4.6	40	6.9	-	60	60
AUG	19.2	3.8	-	3.2	3.9	-	11.0	-	60	40
SEPT	17.4	-	-	7.6	-	-	12.9	-	320	40
OCT	19.5	4.9	62	6.6	4.6	47	8.1	-	298	20
NOV	18.2	2.5	63	4.8	3.5	44	10.6	-	284	0
DEC	20.4	4.7	66	6.6	4.4	47	12.9	-	391	0
TOTAL	186.9	-	-	50.7	-	-	113.7	-	2320	180
AVERAGE	15.6	4.2	58	4.2	4.3	45	9.5	-	193	0



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Date Due

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Water management in Ontario